

**WHAT IS CLAIMED IS:**

1. A signal transmitting apparatus for cell search in a mobile communication system, comprising:

5 a primary synchronization channel (P-SCH) transmitter for placing a first synchronization code at the start of each of a plurality of slots which forms one P-SCH frame to provide slot synchronization and for transmitting the P-SCH; and

10 a secondary synchronization channel (S-SCH) transmitter for transmitting a base station group specific code at the start of each slot in an S-SCH frame and a base station specific code following the base station group specific code in at least one slot, the base station group specific code representing one of the base station groups and the base station specific code representing one of the base stations in the base station group.

15 2. The signal transmitting apparatus of claim 1, further comprising a broadcast channel (BCH) transmitter for mapping system information of the base station on the S-SCH for transmission.

20 3. The signal transmitting apparatus of claim 1, wherein the S-SCH transmitter inserts each symbol of the base station group specific code in each slot of the frame.

25 4. The signal transmitting apparatus of claim 1, wherein the base station specific code is one of a synchronization codes which represent the base station BCH spreading code.

5. A signal transmitting method for cell search in a mobile communication system, comprising the steps of:

transmitting a first synchronization code at the start of each of a plurality of slots which forms one P-SCH frame to provide slot synchronization and for transmitting the P-SCH; and

transmitting a base station group specific code at the start of each slot in an S-SCH frame, the base station group specific code representing one of the base station groups, and transmitting a base station specific code following the base station group specific code in at least one slot, the base station specific code representing one of base stations in the base station group.

6. The signal transmitting method of claim 5, further comprising the step of mapping system information of the base station on the S-SCH with a BCH and transmitting the BCH.

7. The signal transmitting method of claim 5, wherein each symbol of the base station group specific code is inserted in each slot of the frame in the S-SCH transmitting step.

8. The signal transmitting method of claim 5, wherein the same synchronization code is inserted into each slot of the frame to transmit the base station specific code in the S-SCH transmitting step.

9. A cell search apparatus in a mobile communication system, which is slot time-synchronized by receiving a first synchronization code in each slot of a P-SCH frame and in addition receives over the slots of an S-SCH frame a base station group specific code representing one of base station groups and a base station specific code representing one of base stations in the base station group, the apparatus comprising:

a base station group specific code detecting unit that detects the base

station group specific code received on the S-SCH in the slot-synchronized state;  
and

a base station specific code detecting unit that detects the base station  
specific code received, the base station specific code received following the base  
station group specific code.

10. The cell search apparatus of claim 9, wherein the base station  
group specific code detecting unit comprises:

a correlator for calculating a correlation of the base station group specific  
code received in each slot of the S-SCH frame; and

a base station group detector for determining the base station group using  
specific codes corresponding to maxima of correlations detected from the slots.

11. The cell search apparatus of claim 10, wherein the base station  
group detector comprises:

a cyclic shift operator for cyclic-shift operating the correlations and  
comparing the cyclically shifted correlation values with a comma free code table;  
and

a maximum correlation detector for detecting a synchronization code  
corresponding to a maximum of the cyclic-shift operated correlations.

12. The cell search apparatus of claim 11, wherein the base station  
specific code detecting unit comprises:

a correlator for calculating a correlation of the base station specific code  
received in each slot of the S-SCH frame; and

a base station detector for determining the base station using a specific  
code corresponding to a maximum of correlations detected from the slots.

13. The cell search apparatus of claim 12, wherein the correlator calculates the correlations by Hadamard transformation with respect to a predetermined number of synchronization codes.

5 14. A cell search method in a mobile communication system which is slot time-synchronized by receiving a first synchronization code in each slot of a P-SCH frame and in addition receives over the slots of an S-SCH frame a base station group specific code representing one of base station groups and a base station specific code representing one of base stations in the base station group, the method comprising the steps of:

10 detecting the base station group specific code received on the S-SCH in the slot-synchronized state; and

15 detecting a transmitting base station by detecting the base station specific code received, the base station specific code received following the base station group specific code.

15 15. The cell search method of claim 14, wherein the base station group specific code detecting step comprises the steps of:

20 calculating a correlation of the base station group specific code received in each slot of the S-SCH frame; and

determining the base station group using specific codes corresponding to maxima of correlations detected from the slots.

25 16. The cell search method of claim 15, wherein the base station group determining step comprises the steps of:

cyclic-shift operating the correlations and comparing the cyclically shifted correlation values with a comma free code table; and

detecting a synchronization code corresponding to a maximum of the

cyclic-shift operated correlations.

17. The cell search method of claim 14, wherein the base station specific code detecting step comprises the steps of:

5 calculating a correlation of the base station specific code inserted in at least one slot of the S-SCH frame; and

accumulating correlations and determining the base station using a specific code corresponding to a maximum of the accumulated correlations.

10 18. The cell search method of claim 17, wherein the correlations are calculated by Hadamard transformation with respect to a predetermined number of synchronization codes.